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143. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in Irving College, Mechanicsburg, Pa.

A's income$=a/b$th part$=\frac{3}{4}$ of B's income. A's outgo$=m/n$th part$=\frac{1}{2}$ of B's income. B's outgo$=p/q$th part$=1/1$ of A's income. What is the ratio of their savings?

Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Chemistry and Physics, The Temple College, Philadelphia, Pa.

A's outgo$=m/n$th of B's income.

A's saving$=\left(\frac{a}{b}-\frac{m}{n}\right)=\frac{an-bm}{bn}$ of B's income.

B's outgo$=ap/bq$th of B's income.

B's saving$=1-\frac{ap}{bq}=\frac{bq-ap}{bq}$ of his income.

$$\therefore \frac{an-bm}{bn}:\frac{bq-ap}{bq}=\frac{an-bm}{n}:\frac{bq-ap}{q},$$

but $a=3$, $b=4$, $m=p=q=1$, $n=2$.

$\therefore$ The ratio of their savings is 1:1.

ALGEBRA.

117. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Chemistry and Physics, The Temple College, Philadelphia, Pa.

Rationalize $l^{\frac{1}{2}}+m^{\frac{1}{2}}+n^{\frac{1}{2}}+x^{\frac{1}{2}}+y^{\frac{1}{2}}+z^{\frac{1}{2}}=0$.

Solution by the PROPOSER.

Let $u^6+pu^4+qu^3+ru^2+su+t=0$, be the equation having $l^{\frac{1}{2}}$, $m^{\frac{1}{2}}$, $n^{\frac{1}{2}}$, $x^{\frac{1}{2}}$, $y^{\frac{1}{2}}$, $z^{\frac{1}{2}}$ for its roots; then $u^3+pu^2+qu^{\frac{3}{2}}+ru+su^{\frac{1}{2}}+t=0$ is the equation having l, m, n, x, y, z for its roots.

$$\therefore\ u^3+pu^2+ru+t+u^{\frac{1}{2}}(qu+s)=0$$

$$\text{or } u^6+2pu^5+(p^2+3r)u^4+(2t+2pr-q^2)u^3$$
$$+(r^2+2pt-2qs)u^2+(2rt-s^2)u+t^2=0.$$

Let $a=l+m+n+x+y+z=\Sigma(l)$.

$b=lm+ln+lx+ly+lz+mn+mx+my+mz+nx+ny+nz+xy+xz+yz=\Sigma(lm)$.

$c=lmn=lmx+lmy+lmz+lnx+lny+lnz+lxy+lxz+lyz+mnx+mny+mnz+mxy+$
$mxz+myz+nxy+nxz+nyz+xyz=(\Sigma(lmn)$.

$d=lmnx+lmny+lmnz+lnxy+lnxz+lxyz+lmxy+lmxz+lmyz+lnyz+lxyz+lmxy+$
$lmxz+lmyz+mnxy+mnxz+mnyz+mxyz+nxyz=\Sigma(lmnx)$.

$e=lmnxy+lmnxz+lmnyz+lnxyz+lmxyz+mnxyz=\Sigma(lmnxy)$.

$f=lmnxyz$.